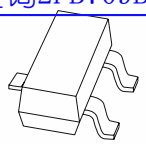


2PB709BRL; 2PB709BSL

50 V, 200 mA PNP general-purpose transistors

Rev. 1 — 28 June 2010 Product data sheet

1. Product profile

1.1 General description

PNP general-purpose transistors in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package		NPN complement
	NXP	JEDEC	
2PB709BRL	SOT23	TO-236AB	2PD601BRL
2PB709BSL			2PD601BSL

1.2 Features and benefits

- Collector current $I_C \leq -200$ mA
- Two current gain selections
- AEC-Q101 qualified
- Small SMD plastic package

1.3 Applications

- General-purpose switching and amplification

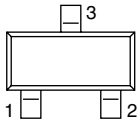
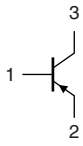
1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	–50	V
I_C	collector current		-	-	–200	mA
h_{FE}	DC current gain	V_{CE} = –10 V; I_C = –2 mA	210	-	460	
	h_{FE} group R		210	-	340	
	h_{FE} group S		290	-	460	

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base		
2	emitter		
3	collector		

sym013

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
2PB709BRL	-	plastic surface-mounted package; 3 leads	SOT23
2PB709BSL			

4. Marking

Table 5. Marking codes

Type number	Marking code[1]
2PB709BRL	MN*
2PB709BSL	MP*

[1] * = -: made in Hong Kong
* = p: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

5. Limiting values

Table 6. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

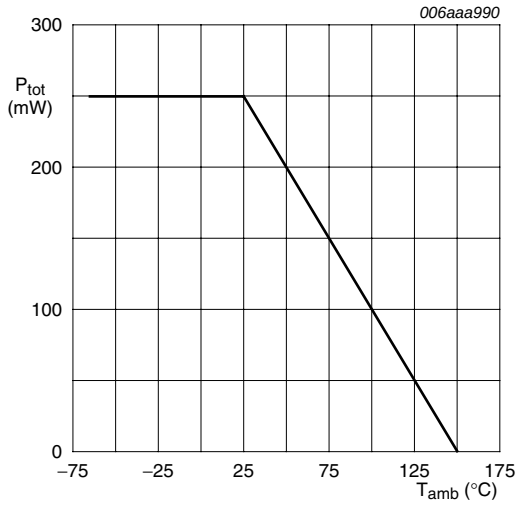
Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter	-	–60	V
V_{CEO}	collector-emitter voltage	open base	-	–50	V
V_{EBO}	emitter-base voltage	open collector	-	–6	V
I_C	collector current		-	–200	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	–250	mA
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms	-	–200	mA

Table 6. Limiting values *...continued*

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	250	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			−55	+150	°C
T_{stg}	storage temperature			−65	+150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



FR4 PCB, standard footprint

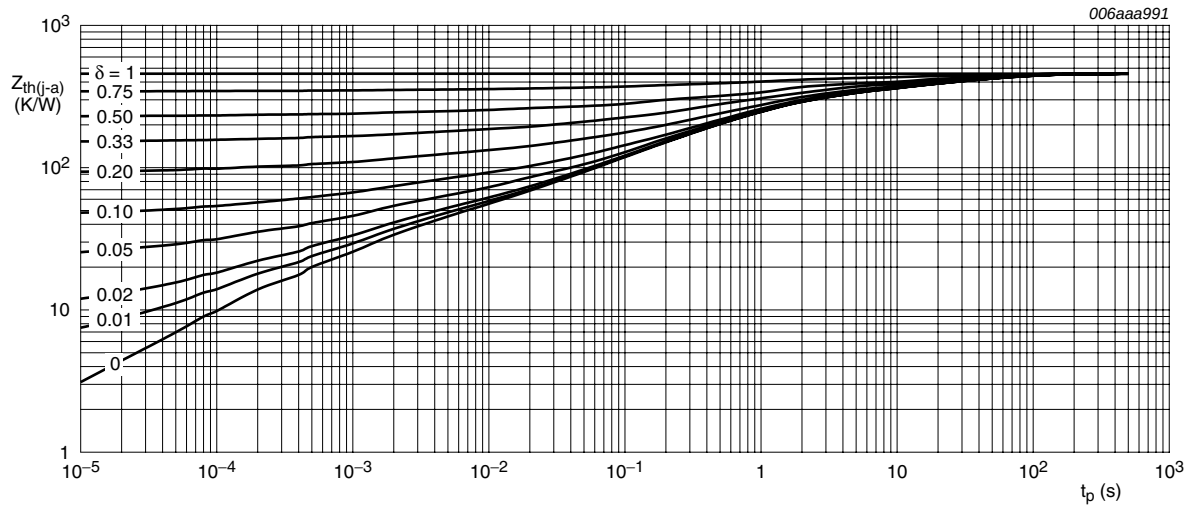
Fig 1. Power derating curve

6. Thermal characteristics

Table 7. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	140	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

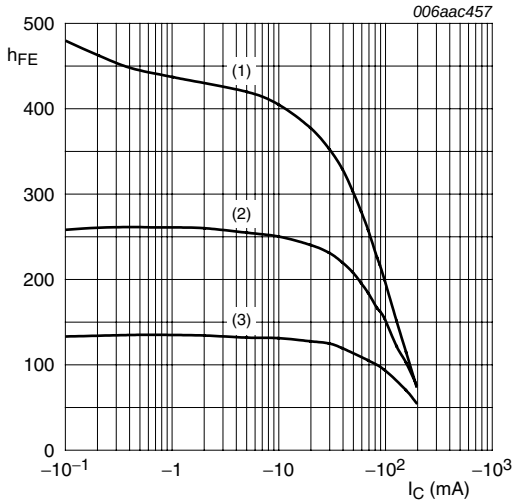
7. Characteristics

Table 8. Characteristics

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = –60 V; I_E = 0 A		-	-	–10	nA
		V_{CB} = –60 V; I_E = 0 A; T_j = 150 °C		-	-	–5	μA
I_{EBO}	emitter-base cut-off current	V_{EB} = –5 V; I_C = 0 A		-	-	–10	nA
h_{FE}	DC current gain	V_{CE} = –10 V; I_C = –2 mA		210	-	460	
	h_{FE} group R			210	-	340	
	h_{FE} group S			290	-	460	
V_{CEsat}	collector-emitter saturation voltage	I_C = –100 mA; I_B = –10 mA	[1]	-	-	–250	mV
f_T	transition frequency	V_{CE} = –6 V; I_C = –10 mA; f = 100 MHz		100	200	-	MHz
C_c	collector capacitance	V_{CB} = –10 V; I_E = i_e = 0 A; f = 1 MHz		-	-	3	pF

[1] Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.02$.



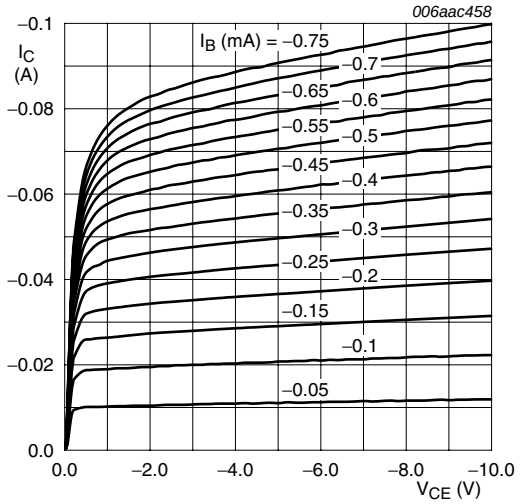
V_{CE} = −10 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

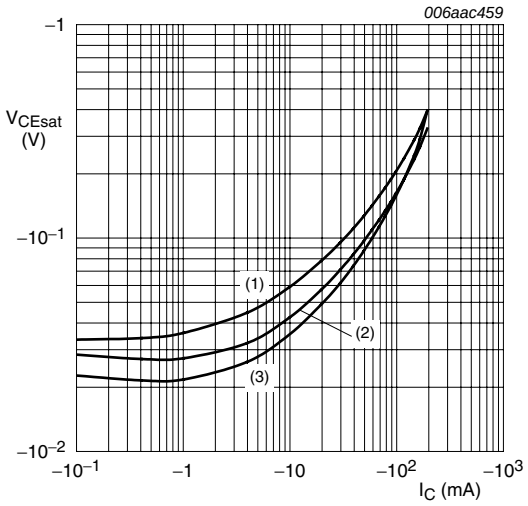
(3) T_{amb} = −55 °C

Fig 3. 2PB709BRL: DC current gain as a function of collector current; typical values



T_{amb} = 25 °C

Fig 4. 2PB709BRL: Collector current as a function of collector-emitter voltage; typical values



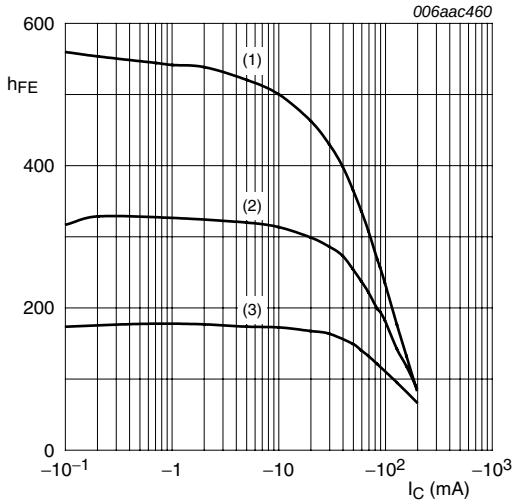
I_C/I_B = 10

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 5. 2PB709BRL: Collector-emitter saturation voltage as a function of collector current; typical values



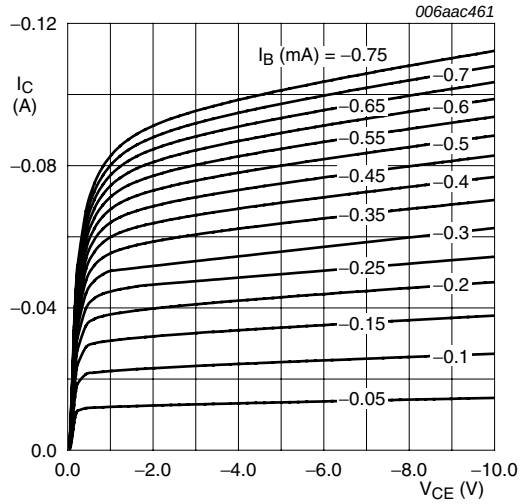
V_{CE} = −10 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

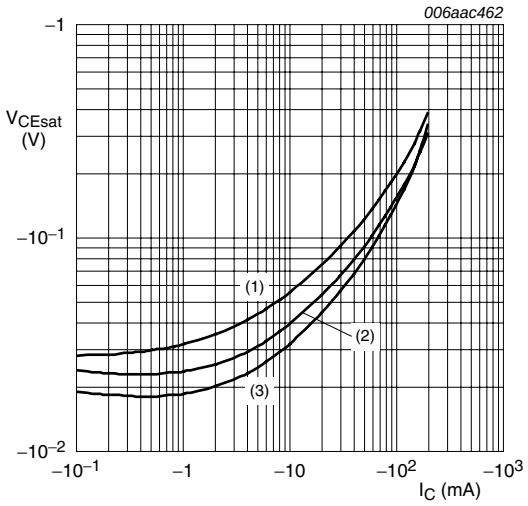
(3) T_{amb} = −55 °C

Fig 6. 2PB709BSL: DC current gain as a function of collector current; typical values



T_{amb} = 25 °C

Fig 7. 2PB709BSL: Collector current as a function of collector-emitter voltage; typical values



I_C/I_B = 10

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 8. 2PB709BSL: Collector-emitter saturation voltage as a function of collector current; typical values

8. Test information

8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

9. Package outline

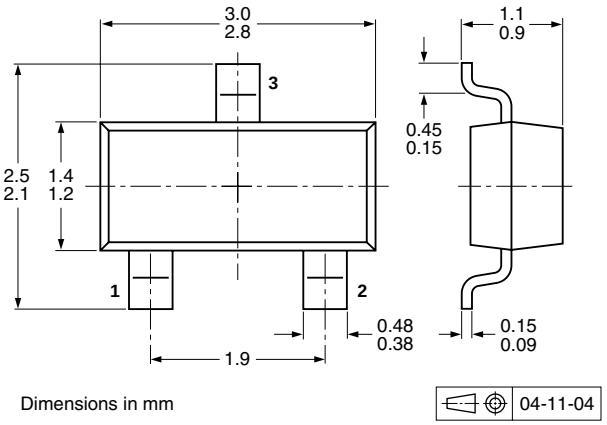


Fig 9. Package outline SOT23 (TO-236AB)

10. Packing information

Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.[1]

Type number	Package	Description	Packing quantity	
			3000	10000
2PB709BRL	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
2PB709BSL				

[1] For further information and the availability of packing methods, see Section 14.

11. Soldering

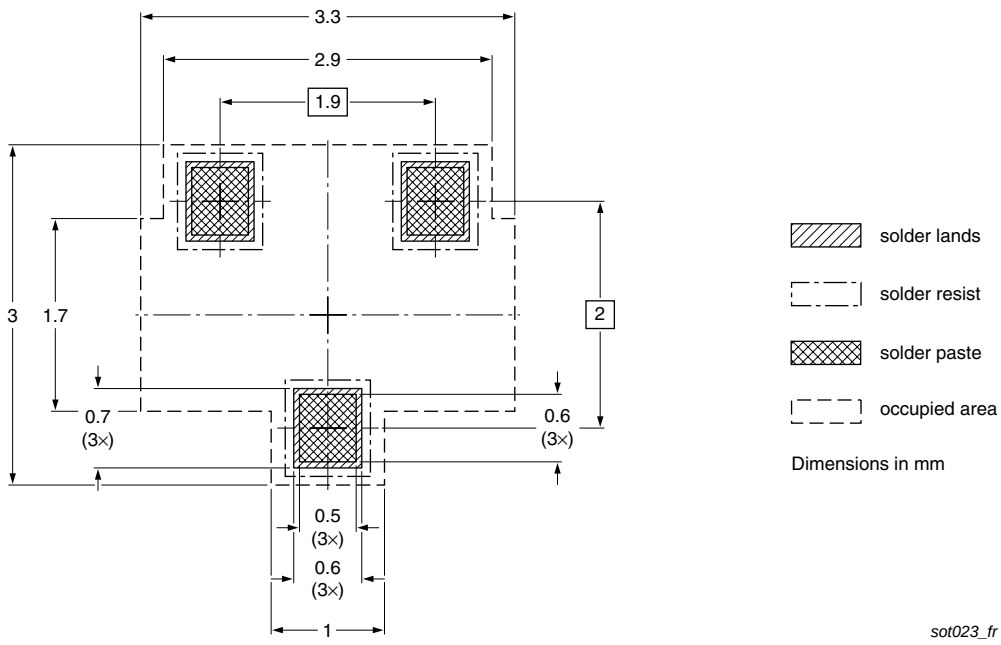


Fig 10. Reflow soldering footprint SOT23 (TO-236AB)

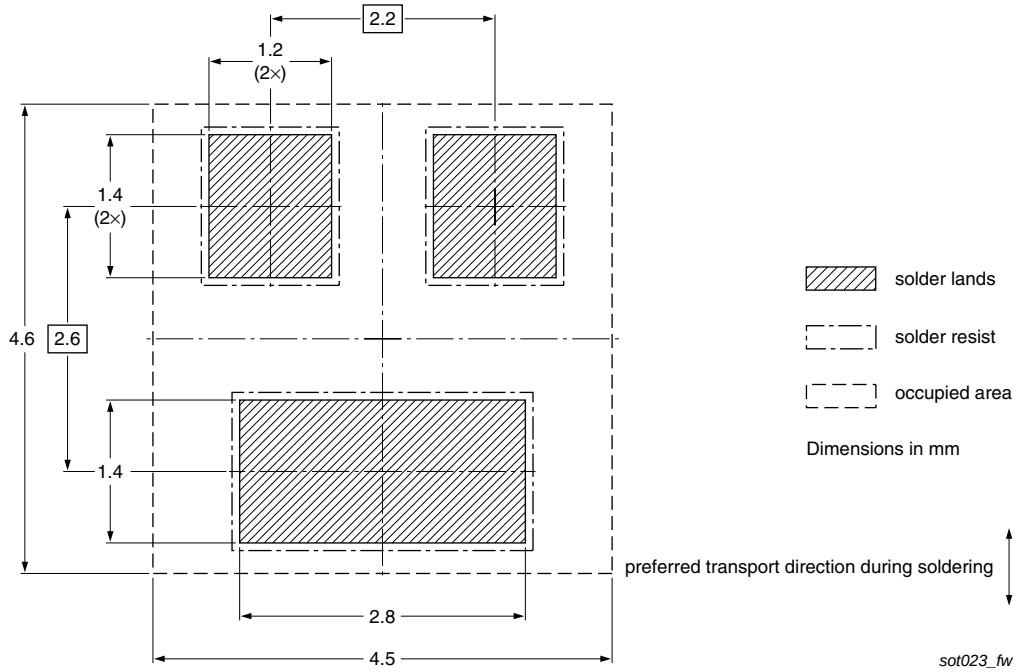


Fig 11. Wave soldering footprint SOT23 (TO-236AB)

12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
2PB709BRL_2PB709BSL v.1	20100628	Product data sheet	-	-

13. Legal information

13.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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15. Contents

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Date of release: 28 June 2010
Document identifier: 2PB709BRL_2PB709BSL